

# Metallics

An **AMERICAN** Source For Premier  
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## DROP-IN ANCHORS MINI – STEEL ZINC

The following Specification Sheet applies to all **Drop-In Anchors – Steel Zinc** including those in our **DIA and JDIA** series.



MINI DROPIN

### Material Specification

Anchor Component	Carbon Steel
Anchor Body	SAE 1009
Plug	SAE 1009
Zinc Plating	ASTM B633, SC1, Type III (Fe/Zn 5)

### Installation Specification

Dimension	Rod/Anchor Diameter, d		
	1/4"	3/8"	1/2"
ANSI Drill Bit Size $d_{bit}$ (in.)	3/8	1/2	5/8
Maximum Tightening Torque, $T_{max}$ , (ft-lbs)	3	5	10
Thread Size (UNC)	1/4-20	3/8-16	1/2-13
Thread Depth (in.)	3/8	13/32	5/8
Overall Anchor Length (in.)	5/8	3/4	1

### Ultimate Load Capacities for Mini Dropin in Normal-Weight Concrete<sup>1,2</sup>

Rod/Anchor Size d in. (mm)	Minimum Embedment Depth h in. (mm)	Minimum Concrete Compressive Strength ( $f'_c$ )					
		3,000 psi (20.7 MPa)		4,000 psi (27.6 MPa)		6,000 psi (41.4 MPa)	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4 (6.4)	5/8 (15.9)	1,100 (6.3)	1,260 (5.7)	1,150 (5.1)	1,650 (7.4)	1,200 (5.3)	1,650 (7.4)
3/8 (9.5)	3/4 (19.1)	1,980 (8.9)	2,700 (12.2)	2,120 (9.5)	4,220 (19.0)	2,270 (10.2)	4,220 (19.0)
1/2 (12.7)	1 (25.4)	3,360 (15.1)	4,400 (19.8)	3,360 (15.1)	4,875 (21.9)	3,750 (16.9)	4,875 (21.9)

1. Tabulated load values are for anchors installed in concrete. Concrete compressive strength must be at the specified minimum at the time of installation.

2. Ultimate load capacities must be reduced by a minimum safety factor of 4.0 or greater to determine allowable working load.

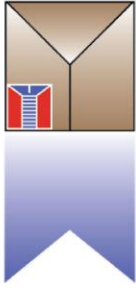
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## Allowable Load Capacities for Mini Dropin in Normal-Weight Concrete<sup>1,2</sup>

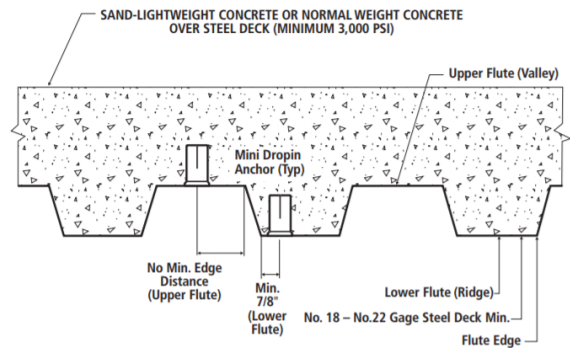
Rod/Anchor Size d in. (mm)	Minimum Embedment Depth h, in. (mm)	Minimum Concrete Compressive Strength (f'c)					
		3,000 psi (20.7 MPa)		4,000 psi (27.6 MPa)		6,000 psi (41.4 MPa)	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4 (6.4)	5/8 (15.9)	275 (1.2)	315 (1.4)	285 (1.3)	415 (1.9)	300 (1.3)	415 (1.9)
3/8 (9.5)	3/4 (19.1)	495 (2.2)	675 (3.0)	530 (2.4)	1,055 (4.7)	570 (2.6)	1,055 (4.7)
1/2 (12.7)	1 (25.4)	840 (3.8)	1,100 (5.0)	840 (3.8)	1,220 (5.5)	940 (4.2)	1,220 (5.5)

1. Allowable load capacities listed are calculated using and applied safety factor of 4.0.
2. Linear interpolation may be used to determine allowable loads for intermediate compressive strengths.

## Ultimate and Allowable Load Capacities for Mini Dropin Installed Through Steel Deck into Lightweight Concrete<sup>1,2,3</sup>

Rod/Anchor Size d in. (mm)	Minimum Embed. Depth h, in. (mm)	Lightweight Concrete Over Min. 20 Ga. Steel Deck. f'c ≥ 3,000 psi (20.7 MPa)			
		Minimum 1-3/4" Wide Deck			
		Ultimate Load		Allowable Load	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4 (6.4)	5/8 (15.9)	740 (3.3)	1,880 (8.5)	185 (0.8)	470 (2.1)
3/8 (9.5)	3/4 (19.1)	880 (4.0)	2,040 (9.2)	220 (1.0)	510 (2.3)
1/2 (12.7)	1 (25.4)	1,380 (6.2)	2,120 (9.5)	345 (1.6)	530 (2.4)

1. The metal deck shall be No. 22 gage to No. 18 gage thick steel [0.030-inch to 0.047-inch base metal thickness (0.75 mm to 1.20 mm)].
2. Allowable load capacities listed are calculated using and applied safety factor of 4.0.
3. Tabulated load values are for anchors installed with a minimum edge distance of 7/8" when installed through the lower flute. Anchors installed through the upper flute may be in any location provided the proper installation procedures are maintained.



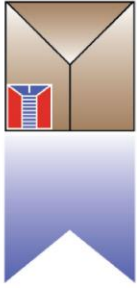
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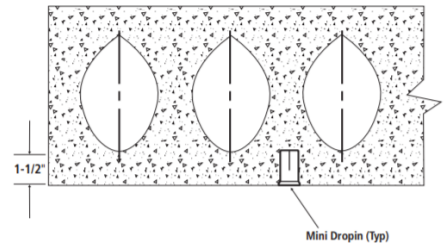
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## Ultimate and Allowable Load Capacities for Mini Dropin in Precast Hollow Core Concrete Plank<sup>1,2</sup>

Rod/ Anchor Size d in. (mm)	Minimum Embed. Depth h, in. (mm)	Minimum Spacing in. (mm)	Minimum Edge Distance in. (mm)	Min. Concrete Compressive Strength f'c ≥ 5,000 psi (34.5 MPa)			
				Ultimate Load		Allowable Load	
				Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4 (6.4)	5/8 (15.9)	3 (76.2)	3 (76.2)	1,400 (6.2)	1,840 (8.3)	350 (1.6)	460 (2.1)
3/8 (9.5)	3/4 (19.1)	4-1/2 (114)	4-1/2 (114)	2,600 (11.7)	3,400 (15.3)	650 (2.9)	850 (3.8)
1/2 (12.7)	1 (25.4)	6 (152.4)	6 (152.4)	2,600 (11.7)	3,540 (15.9)	650 (2.9)	885 (4.0)

1. Tabulated load values are for anchors installed in concrete. Concrete compressive strength must be at the specified minimum at the time of installation.  
2. Allowable load capacities listed are calculated using an applied safety factor of 4.0.



## DESIGN CRITERIA (ALLOWABLE STRESS DESIGN)

### Combined Loading

For anchors loaded in both shear and tension, the combination of loads should be proportioned as follows:

$$\left( \frac{N_u}{N_n} \right) + \left( \frac{V_u}{V_n} \right) \leq 1$$

Where:  $N_u$  = Applied Service Tension Load  
 $N_n$  = Allowable Tension Load  
 $V_u$  = Applied Service Shear Load  
 $V_n$  = Allowable Shear Load

## LOAD ADJUSTMENT FACTORS FOR SPACING AND EDGE DISTANCE<sup>1,2,3</sup>

### Anchor Installed in Normal-weight Concrete

Anchor Dimension	Load Type	Critical Distance (Full Anchor Capacity)	Critical Load Factor	Minimum Distance (Reduced Capacity)	Minimum Load Factor
Spacing (s)	Tension and Shear	$s_{cr} = 3.0h_v$	$F_{NC} = F_{VC} = 1.0$	$s_{min} = 1.5h_v$	$F_{NS} = F_{VS} = 0.50$
Edge Distance (c)	Tension	$c_{cr} = 12d$	$F_{NC} = F_{VC} = 1.0$	$c_{min} = 6d$	$F_{NC} = 0.90$
	Shear <sup>1</sup>	$c_{cr} = 12d$	$F_{NC} = F_{VC} = 1.0$	$c_{min} = 6d$	$F_{VC} = 0.75$

- Allowable loads for anchors loaded in shear parallel to the edge have no load factor  $F_{VC} = 1.0$  when installed at minimum edge distances.
- Allowable load values found in the performance data tables are multiplied by reduction factors when anchor spacing or edge distances are less than critical distances. Linear interpolation is allowed for intermediate anchor spacing and edge distances between critical and minimum distances. When an anchor is affected by both reduced spacing and edge distance, the spacing and edge reduction factors must be combined (multiplied). Multiple reduction factors for anchor spacing and edge distance may be required depending on the anchor group configuration.

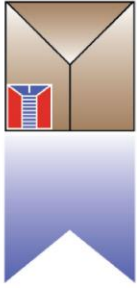
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## Anchor Installed in Through Steel Deck Structural Lightweight Concrete

Anchor Dimension	Load Type	Critical Distance (Full Anchor Capacity)	Critical Load Factor	Minimum Distance (Reduced Capacity)	Minimum Load Factor
Spacing (s)	Tension and Shear	$s_{cr} = 3.0h_v$	$F_{Ns} = F_{Vs} = 1.0$	$s_{min} = 1.5h_v$	$F_{Ns} = F_{Vs} = 0.50$

3. Allowable load values found in the performance data tables are multiplied by reduction factors when anchor spacing is less than critical distances. Linear interpolation is allowed for intermediate anchor spacing between critical and minimum distances. Multiple reduction factors for anchor spacing may be required depending on the anchor group configuration.

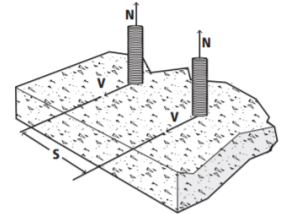
## LOAD ADJUSTMENT FACTORS FOR NORMAL-WEIGHT AND LIGHTWEIGHT CONCRETE

### Spacing, Tension ( $F_{Ns}$ ) & Shear ( $F_{Vs}$ ) (Normal-weight & Lightweight Concrete over deck)

Dia. (in.)	1/4	3/8	1/2	
$h_v$ (in.)	5/8	3/4	1	
$s_{cr}$ (in.)	1-7/8	2-1/4	3	
$s_{min}$ (in.)	1	1-1/8	1-1/2	
Spacing, s (in.)	1	0.50		
	1-1/8	0.60	0.50	
	1-1/2	0.80	0.67	0.50
	1-7/8	1.00	0.83	0.63
	2		0.89	0.67
	2-1/4		1.00	0.75
	2-1/2			0.83
	3			1.00

Notes: For anchors loaded in tension and shear, the critical spacing ( $s_{cr}$ ) is equal to 3 embedment depths ( $3h_v$ ) at which the anchor achieves 100% of load.

Minimum spacing ( $s_{min}$ ) is equal to 1.5 embedment depths ( $1.5h_v$ ) at which the anchor achieves 50% of load.

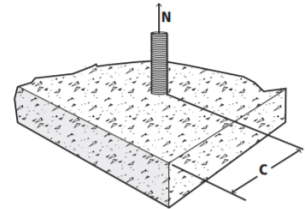


### Edge Distance, Tension ( $F_{Nc}$ ) (Normal-weight concrete only)

Dia. (in.)	1/4	3/8	1/2	
$c_{cr}$ (in.)	3	4-1/2	6	
$c_{min}$ (in.)	1-1/2	2-1/4	3	
Edge Distance, c (in.)	1-1/2	0.90		
	2	0.93		
	2-1/4	0.95	0.90	
	2-1/2	0.97	0.91	
	3	1.00	0.93	0.90
	4		0.98	0.93
	4-1/2		1.00	0.95
	5			0.97
	6			1.00

Notes: For anchors loaded in tension, the critical edge distance ( $c_{cr}$ ) is equal to 12 anchor diameters ( $12d$ ) at which the anchor achieves 100% of load.

Minimum edge distance ( $c_{min}$ ) is equal to 6 anchor diameters ( $6d$ ) at which the anchor achieves 90% of load.



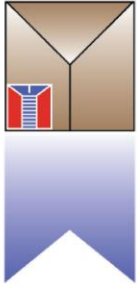
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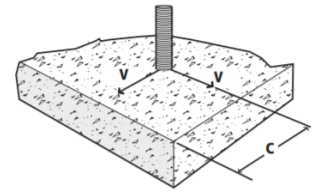
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## Edge Distance, Shear ( $F_{VC}$ ) (Normal-weight concrete only)

Dia. (in.)	1/4	3/8	1/2
$c_{cr}$ (in.)	3	4-1/2	6
$c_{min}$ (in.)	1-1/2	2-1/4	3
Edge Distance, $c$ (in.)	1-1/2	0.75	
	2	0.83	
	2-1/4	0.88	0.75
	2-1/2	0.92	0.78
	3	1.00	0.83
	4		0.94
	4-1/2		1.00
	5		
6			1.00

Notes: For anchors loaded in shear, the critical edge distance ( $c_{cr}$ ) is equal to 12 anchor diameters ( $12d$ ) at which the anchor achieves 100% of load.

Minimum edge distance ( $c_{min}$ ) is equal to 6 anchor diameters ( $6d$ ) at which the anchor achieves 75% of load.



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